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Number 227

Activities for February
(Not for Publication)

March, 1933

FOREST INSECTS

Spread of southern pine beetle.--For the first time in 40 years Dendroctonus frontalis Zimm. has reappeared in epidemic status within the most northern limit of its range, according to reports received from R. A. St. George, Asheville, N. C. It is known to infest at least two counties in southern Pennsylvania, several localities between Washington, D. C., and Cumberland, Md., and Fairfax County, Va. Although several species of pines have been attacked, virgin shortleaf has probably suffered most. Examination of samples from several hundred acres of merchantable pine timber near Fairfax, Va., revealed heavy broods of the beetle that have successfully overwintered in the trunks of the trees. Woodpeckers have worked the mid and upper portions of the trunks of many of the trees quite heavily, probably aiding materially in reducing the numbers of the pests. The infested trees are believed to have been weakened as a result of the drought which has prevailed in this region for the past 2 years. Combined with this, mild winters have favored insect development. This is regarded as the most notable outbreak of this beetle in this section since that of 1893.

Bark beetles in thick-bark pines survive coldest weather.--J. A. Beal and W. J. Buckhorn, Portland Oreg., report that "On February 7 to 10, upon advice of the Weather Bureau," they "made a trip to the Ochoco National Forest and placed mercurial thermometers beneath the bark of a dozen trees of varying bark thickness. * * * the temperature, which for over a month had stayed above zero, very accommodately dropped to 26 degrees below. Readings were taken every hour for a period of 66 hours, with a blizzard raging during a portion of this time. At the end of 3 days," Messrs. Beal and Buckhorn "returned to Portland with a very complete record of subcortical temperatures under varying conditions of bark thickness and with different types of infested trees at low air temperatures, rarely exceeded in the pine belt of this region." They "found a spread in temperature of from 8 to 29 degrees in bark of varying thickness and a lag of 1 to 2 hours in the response of bark to changes in air temperature. These records show that, even under the lowest temperatures known to prevail in the pine region, bark-beetle broods in thick-bark trees are protected and are able to maintain the species."

Burning in June for control of Douglas-fir beetle spares natural enemies.--W. D. Bedard, Coeur d'Alene, Idaho, in a study of Dendroctonus pseudotsugae Hopk. "shows that if control (by cutting, decking, and burning the infested trees) could be instituted in June, subsequent to the first emergence and attack of this bark beetle, the most important

parasite, Coeloides brunneri Vier., and the most important predator, Ionchaea corticis Taylor, would be spared, as at that time they would not have emerged from the trees in which the beetles overwintered. In many areas it would still be possible to use fire in the control of this insect in June; in others it would be prohibitive because of the danger involved. * * * Fall control, as practiced at present, is not only effective in destroying the injurious insects but also destroys important parasites and predators."

CEREAL AND FORAGE INSECTS

Cold snap at San Antonio fails to kill sorghum midge and principal parasite.—"Observations were made," report E. V. Walter and Lee Seaton, San Antonio, Tex., "on the effect of a minimum air temperature of 14° F. on the sorghum midge (Contarinia sorghicola Coq.). Heads were selected in the field immediately after this cold snap and 100 infested spikelets picked at random from several heads were dissected. These showed: Coooned larvae apparently alive, 82; coooned larvae dead, 14; Eupelmus popa Gir. larvae alive, 11; Eupelmus popa larvae dead, 0. Later dissections gave results as follows: Coooned larvae apparently alive, 87; coooned larvae dead, 15; Eupelmus popa larvae alive, 4; Eupelmus popa larvae dead, 1. From this it is seen that the cold weather has apparently had little effect on the midge or its parasite."

Sugarcane borer killed by cold at Beaumont, Tex.—A. I. Balzer reports that "Two successive days in February with 15° F. increased the mortality of Diatraea saccharalis Fab. to 88.2 percent in late-planted corn. A year ago with no frost recorded to the same date the mortality was less than 10 percent in late corn. However, it is interesting to note that in January 1930, when the temperature was at 10° F., a mortality of 99 percent was found soon after the freeze."

Hay damaged heavily by leafhoppers.—"Since 1929 an effort has been made at Arlington Experiment Farm to determine losses caused by Empoasca fabae (Harris) to alfalfa in field cages each one square rod in area and covered with tobacco cloth," reports F. W. Poos, Rosslyn, Va. "An attempt was made to maintain a heavy infestation (as frequently occurs under natural conditions) in one cage, while a cage nearby was kept practically free from these leafhoppers. During 1930 the extreme heat and drought made it impossible for the leafhoppers to live long enough in the cages for any significant data to be obtained. The results of these studies, based upon four cages, except during 1929 when only two cages were in operation, are as follows": In 1929 the hay in the infested cages showed a loss of 26 percent, based on air-dried weights (spring seeding, only two cuttings); in 1931 the loss was 27 percent, based on second and third cuttings only; in 1932 the loss was 23.5 percent, based on three cuttings, green weights only. "In 1929 the hay from the cages was referred to the Bureau of Agricultural Economics for grading and the infested cages yielded U. S. Grade 2 leafy, and the

uninfested cages yielded U. S. Grade 1. The price difference at Kansas City in 1928 and 1929 averaged \$2.10 per ton. This decrease in quality caused losses averaging approximately 33 percent. The Bureau of Chemistry analyzed the hay in these samples and reported no significant differences in the percentage of water, ash, nitrogen, fat, and fiber composition."

Fluosilicates in grasshopper baits.—J. R. Parker, Bozeman, Mont., reports that "Barium and sodium fluosilicates were compared with dry sodium arsenite as poison ingredients in grasshopper bait. Both these substances gave as good results as the sodium arsenite. The fluosilicates are apt to settle out quickly when in solution, owing to their slight degree of solubility. When used with a cane-molasses solution, a precipitate was found because the quantity which settled out was about one-fourth greater by weight than the original quantity of the fluosilicate. This seemed to affect the killing power of a low-grade brand of sodium fluosilicate by making it practically worthless when used with cane molasses. However, the effectiveness of a finely ground material containing at least 97 1/2 percent of sodium fluosilicate seemed not to have been reduced by the molasses solution. The fluosilicates were used at the rate of 4 pounds per 100 pounds of dry bran and the sodium arsenite at the rate of 2 1/2 pounds. So far the laboratory cage method is proving to be of value * * * cane molasses and amyl acetate need not be used together, but beet molasses is better when amyl acetate is added to it. Both cane molasses and amyl acetate, used alone, were better than just the bran, arsenic, and water. * * * from 20 to 30 percent greater mortalities were obtained when the baits were used with third, fourth, and fifth instar nymphs than with first and second instar nymphs. In other words, 20 to 30 percent better kills were obtained with the older specimens than with the younger ones. This has been more or less substantiated by field experiences."

Morphology of parasite of the fall armyworm.—Reporting on a study of Chelonus texanus Cress., C. C. Hill, Carlisle, Pa., says: "The newly laid egg is smooth, subcylindrical, and arcuate. The primary larva is cyclopeanlike in formation but before molting into the second instar its body enlarges many times over its primary size, while the head capsule retains its original shape. The mandibles of the first-instar larva are simple and untoothed but those of later instars become conspicuously toothed. The egg is laid into the host egg and parasitic development takes place synchronously with that of the host. The parasitic larva early in its development takes its position partly curled around the hind intestine. Eventually it gorges itself on the contents of the host and spins its cocoon within the cocoon of the latter."

Hessian fly parasite is parthenogenetic.—W. T. Emery, Wichita, Kans., reports that "Platygaster herrickii Pack. bred in the laboratory in February proved to be parthenogenetic. Hessian fly eggs parasitized January 24 by one unmated female were developed through to white puparia and were dissected February 24. Several spherical forms of the parasite were found in a puparium."

COTTON INSECTS

Mortality of pink bollworm larvae.--W. L. Owen, Jr., Presidio, Tex., reports results of an experiment "to determine the mortality of pink bollworm larvae in bolls buried 4 inches in soil, both dry and irrigated; bolls left on the surface of the soil, both dry and irrigated; and in bolls left on standing stalks. * * * On December 10, heavily infested cotton bolls were installed in screen cylinders for periodic winter and spring examinations. * * * An examination of one cylinder from each treatment, as well as bolls from one standing stalk on February 14, and again on February 28, showed that the heaviest kill had taken place in bolls buried 4 inches and irrigated in December, and the next heaviest in the buried but not irrigated cylinder. In the remaining treatments there were but slight differences in mortality. Two loose larvae were recovered from the soil beneath the standing stalk. Mortality this year was less than in similar tests last year. * * * In the standing stalk treatment there was considerable difference, 89.1 percent kill in 1932 and only 49.5 percent in 1933. It will also be noted that thus far the mortality in bolls buried in December and not irrigated is higher this year than last."

Pink bollworm overwinters in Mexico best in dry, unplowed land.--C. S. Rude, Tlahualilo, Durango, Mex., reports that "Examinations to determine the overwintering larval population of the pink bollworm in a 1,200-acre field of 'soca' cotton were started in January. The stalks in this field were cut, raked, and burned late in October. About one-third of the field was flooded in December and the rest left dry. Late in January about half of the flooded portion was plowed, thus providing three types of treatment. It was found that in the dry unplowed land there was an average of 7.88 live larvae per square yard; in the flooded unplowed land an average of 2.66 live larvae per square yard; and in the flooded and plowed land an average of only 1.33 live larvae per square yard."

Cultural control of pink bollworm.--D. A. Isler and A. J. Chapman, Presidio, Tex., have completed plant and soil examinations to determine reduction in worm population by clean-up. A summary of results shows "an average of 18.27 bollworms per square yard in fields examined before cleaning and 0.39 per square yard in fields examined after cleaning, or an average reduction per square yard of 97.87 percent. * * * the percentage reduction in worm population by the cleaning plus natural mortality on the 10 farms cleaned approximately between November 11 and January 20 by the Bureau of Plant Quarantine ranged from 91.18 to 100 percent. * * * The averages on a farm basis were 10.13 larvae per square yard before cleaning and 0.247 per square yard after cleaning, a reduction of 96.86 per cent."

Boll weevil activity halted by cold weather in February.--G. L. Smith, J. C. Clark, and A. L. Scales, Tallulah, La., reporting observations on boll weevil hibernation, state that "In February a total of 50 active weevils was recorded for the 70 cages, as compared with 154 for

January. In the same number of cages last year 1,071 weevils were recorded for February. * * * For a comparison, 175 weevils were taken last February from 26 flight-screen traps and 1 weevil from 20 screen traps this February."

Septicemia of the pink bollworm interferes with parasite breeding.-- In October 1932 L. W. Noble and H. R. Johnston reported that the rearing of the parasites Exeristes roborator Fab. and Microbracon brevicornis Wesm. was considerably handicapped by the high rate of mortality among the pink bollworms that were being used as hosts in the parasite laboratory at Presidio, Tex. From their description G. F. White, in charge of the Bureau's Division of Insect Pathology, tentatively diagnosed the trouble as a bacterial disease similar to hornworm septicemia and cutworm septicemia. At Dr. White's suggestion Mr. Noble conducted a series of inoculation tests which resulted in 3 of the inoculated worms dying in less than 24 hours and all 20 of them were dead in 48 hours, while none of the 60 worms in the 3 series of checks were affected. Slide smears made from dying or recently dead pink bollworm larvae further corroborated Dr. White's diagnosis. The presence of this disease of the pink bollworm with its high rate of mortality has necessitated the sterilization of all equipment and the use of other prophylactic measures to prevent the losses from it in the parasite laboratory.

INSECTS AFFECTING MAN AND ANIMALS

Another sand fly reared from tree holes.--W. E. Dove, Savannah, Ga., reports that "A species (of Culicoides) reported as a biter of man in Maryland, Florida, and elsewhere, C. biguttatus Coq., has been reared from tree holes. This is the first record of the rearing of this species. Prior to this time only C. guttipennis Coq. was reared from tree holes."

Treatment of horses for bot control.--In preparation for the carbon disulphide treatment for horse bots (Gastrophilus sp.) this division has recommended that 30 days prior to such treatment the bot eggs on the animal to be treated be destroyed. On January 2 at Ames, Iowa, R. W. Wells found that 4.15 percent of a representative collection of eggs from 13 horses were still viable. On February 15 he examined eggs from 10 horses and found none viable. He concludes that at the latitude of Ames nothing would be gained by washing the legs of horses with ovicides after the first of February.

Game fish destroy mosquito-killing top minnow.--"Two field inspections were made this month (February) to learn of the present status of the introduced Gambusia patruelis (Baird and Girard) in ponds which had been flooded last season," reports H. H. Stage, Portland, Oreg. "The original pond where they had been planted and where they occurred in large numbers after the flood of 1932 gave evidence of few fish at this time. * * * it is thought that the large numbers of game fish which were washed into the pool during the flood stage in June 1932 at least partly

destroyed the Gambusia. An attempt was made to seine out the predacious species after the waters receded, and, although thousands were removed, there were probably enough remaining to kill a great many mosquito-killing fish. It was likewise difficult for the Gambusia to maintain their numbers because of the lack of aquatic vegetation and other shelter. Other ponds in the vicinity in which no game fish were present contained satisfactory numbers of the Gambusia."

Flytraps reduce myiasis.--E. W. Laake submits a brief summary of the data obtained by himself, E. C. Cushing, and H. E. Parish in Menard County, Texas, and adjoining counties. He says, "the results for 1932 show a reduction of 42 percent in the percentage infestation of an average monthly population of 122,982 animals of all classes in the trapped area, as compared to an average monthly population of 70,462 animals of all classes in the control area. * * * the average reduction in population of the screw-worm fly in the trapped area from March 30 to October 29, 1932, as determined by the jar method, was over 57 percent. These results, in the absence of any other known variations of importance between the two areas, indicate that the 42 percent reduction in myiasis and the 57 percent reduction of the fly population in the trapped area were due to the systematic operation of the flytraps."

STORED PRODUCT INSECTS

Effect of temperature on different stages of cigarette beetle.--W. D. Reed, Richmond, Va., reports that "It was necessary to expose adults (of Lasioderma serricorne Fab.) to an average temperature of 26.29° F. for 85 hours in order to obtain a 100 percent kill. A 70 percent kill was obtained after 39 hours' exposure at the above temperature. As an average temperature of 23.04° F. all of the test adults were killed by an exposure of 21 hours. All of the test pupae were killed in 15 hours at an average temperature of 26.29° F. When the temperature was lowered to an average of 23.04° F. all pupae were dead after 7 hours' exposure. The larvae showed a greater resistance to cold than did the adults and pupae. After an exposure of 162 hours at an average temperature of 26.29° F., 97 percent of the larvae were dead. After 85 hours at that temperature 80 percent of the test larvae were dead * * * None of the larvae were killed by an exposure of 15 hours * * * After an exposure of 146 hours to an average temperature of 23.04° F., 93 percent of the larvae were killed. After 21 hours only 43 percent of the larvae were killed."

Buried traps capture more nitidulid larvae than do surface traps.--Reporting on winter trapping of dried fruit insects, Perez Simmons, Fresno, Calif., states that "2 traps baited with moistened cull dried peaches were set at a fruit dump near Round Mountain. One trap was buried to the top and the other was set on the surface of the ground. * * * The trap on the surface took no beetles until the collection of January 14. This trap captured a total of 17 Carpophilus hemipterus L. and 3

other Nitidulidae. The buried trap took beetles beginning December 24 and captured a total of 111 Carpophilus hemipterus, 26 adult nitidulids of other species, and 15 nitidulid larvae. The weak powers of locomotion to be expected during the winter months are illustrated, as 7 times as many adult Nitidulidae entered the easily accessible buried trap as were taken in the adjacent trap, of which the entrance was 12 inches above the surface."

Bean weevil infestation gains.--C. K. Fisher, Modesto, Calif., reports that in a total of 2,246 warehouse bean samples examined in 1932 1,685, or 75.02 percent, showed infestation (by Acanthoscelides obtectus Say). "A total of 1,952 samples of blackeye cowpeas were examined, of which 1,591, or 81.5 percent, showed infestation. Compared with the 1931 season, this is an increase of 9.24 percent. * * * Infestations in the following varieties showed increases over the 1931 season: Limas, reds, small whites, cranberries, and bayos. Pinks showed a small decrease. The increase in weevil infestation during the past two seasons is explained by low prices and poor market conditions. Market conditions have caused many ranchers to store their beans on the ranches rather than in public warehouses. Many of these beans stored on the ranches have become sources of infestation for the growing crop."

Effect on pea weevil of burying in soil.--Tom Brindley, Moscow, Idaho, reports that in an experiment "to determine the effect of the time of burying on the emergence of Bruchus pisorum L., 50 pods were buried at similar depths at the same time and an equal number of each was placed on top of the ground as a check. * * * Very few of the weevils emerge when the peas are buried at a depth of 3½ inches if the emergence hole in the pea has not been opened before the peas are buried. * * * Previous experiments had shown that burying weevilly peas would prevent the emergence of the adults when carried on in small cages, so this experiment was designed to test it on a larger scale, with farm implements. Such an experiment is necessary in order to control the weevils in shattered peas. The peas were buried immediately after the first harvesting. * * * 15,000 weevilly peas were spread out evenly on each of three 6-foot-square plots. One of these plots was plowed under by a caterpillar tractor, another was disked under, and a third was left as a check. Two plots of vines, just as they grew in the field, were also treated. * * * On the check plot 69.07 percent of the weevils emerged, 13.82 percent from the disked plot, and 2.63 percent from the plot that was plowed under. * * * it is evident, during this season, that plowing under the shattered peas immediately after early harvesting killed most of the weevils in the shattered peas. * * * Shelled peas and also peas in pods were spread on the surface of the ground at weekly intervals. The temperature at the surface of the ground was taken each day at 1 p.m. The maximum temperature obtained was 133.8° F. * * * It is evident that the greatest mortality occurs when the weevils are in the larval stage and that a greater number die in the shelled peas than in the peas in the pods."

TOXICOLOGY AND PHYSIOLOGY OF INSECTS

Derris apparently not entirely dependent on rotenone for insecticidal effects.--Summarizing results of tests by himself and W. N. Sullivan on the relative effectiveness of rotenone and derris extracts on mosquito larvae, F. L. Campbell, Takoma Park, Md., reports: "When suspended in water, rotenone was relatively ineffective against fourth-instar mosquito larvae, Culex quinquefasciatus Say, from Florida. It was found that the effect of rotenone was greater in aqueous solutions of sodium bicarbonate and still greater in aqueous solutions of gelatin. Check solutions of these two substances had no effect on the larvae. The use of gelatin promises to permit a fairer comparison of the effect of rotenone and derris extract against mosquito larvae. Rotenone is not sufficiently soluble in kerosene to make an effective spray for house flies. However, an effective preparation was made by percolation of kerosene through derris powder, indicating that rotenone is not the only substance in derris that is toxic to house flies. Effective concentrations of rotenone can be obtained in 10 percent solutions of chlorobenzene or cyclohexanone in kerosene."

FRUIT AND SHADE TREE INSECTS

Pecan weevil not controlled by soil cultivation.--T. L. Bissell, Experiment, Ga., reports the completion of experiments to determine whether the larvae of the pecan weevil will burrow into soil that has been plowed, raked, and rolled. Results on two types of soil--Cecil clay loam and Cecil sandy loam--show that the cultivation performed did not prevent larvae from burrowing. These results corroborate those obtained in January, that practically the same number of larvae burrowed in treated and untreated soils.

Trap catches of moths at Albany, Ga.--Herbert Spencer reports that "Collections of moths at bait traps hung in pecan trees in a commercial grove have been continued and, while fewer individuals have been caught than in previous months, the same species of cutworms taken previously have appeared in numbers during each warm period. This work is being done to obtain information on winter hosts that might carry Trichogramma minutum Riley through our mild winters by furnishing eggs upon which the parasites might subsist." A total of 1,674 moths were caught in February, while temperatures ranged from 33° to 83° F.

Heat sterilization of codling moth larvae.--"Further data were obtained in February," by E. H. Siegler and Francis Munger, Takoma Park, Md., "on the effect of high temperatures against codling moth larvae. * * * the heat conductivity of the wood was lower than that of the corrugated paper. This was to be expected and merely serves to emphasize the fact that the sterilization of larvae in a commercial way will require a considerable exposure to heat in view of the protection afforded the larvae by the wood of the lug boxes, baskets, etc. In these pre-

liminary laboratory tests we have found that the order of effectiveness is (1) water, (2) steam, and (3) dry heat." Sterilization with dry heat required approximately five times as long as with hot water.

Effect of temperature on adult Mediterranean fruit flies.--O. C. McBride, of the Honolulu, Hawaii, laboratory, summarizes the results obtained thus far in an experiment on the effect of temperature on sexual maturity and the rate of oviposition of *Ceratitidis capitata* Wied.: "(1) A constant temperature of 85° F. appears to have an irritating effect on the adults; (2) the time between emergence and the deposition of the first fertile eggs was 8 days, as compared with 7 days at 75° F.; (3) a lower number of eggs deposited at 85° F. are fertile than of those deposited at 75° F.; (4) the average number of eggs deposited per female for the first 10-day period at 85° F. was 10.6, as compared with 23.3 per female for the first 10-day period for those held at 75° F.; (5) no fertile eggs have been deposited at 65° F. or lower where both males and females were held at those temperatures from the time of emergence; (6) although the number held at each temperature is not high enough to give accurate data on longevity, yet it is clearly shown that there is a higher rate of mortality and shorter length of life at the higher temperatures."

JAPANESE BEETLE AND ASIATIC BEETLE RESEARCH

Lateral migration of Jap beetle grubs.--I. M. Hawley, Moorestown, N. J., who last year reported on the migration of grubs in fallow soil (see April 1932 Monthly Letter), now reports: "This year it was decided to test the extent of the migration when grass turf was present. Two bins, each 8 feet long and 4 feet wide, were filled with about 1 foot of soil in October. In one of the bins grass seed was planted and the other was left fallow as a check. On January 9, when a good stand of grass had developed, 100 field-collected grubs were placed in a trench 1 foot from the end of each bin, permitting a migration as far as 7 feet in one direction but only 1 foot in the other. On February 15 and 16 * * * in the bin with grass, 1 grub out of 92 recovered had moved more than 80 inches, 2 more than 70 inches, 4 more than 60 inches, 4 more than 50 inches, 5 more than 40 inches, 10 more than 30 inches, 16 more than 20 inches, and 30 more than 10 inches. The others were less than 10 inches from the starting point or had moved toward the other side of the bin only 1 foot away. In the bin without grass, 3 of 79 grubs recovered had moved more than 80 inches, 11 more than 70 inches, 18 more than 60 inches, 32 more than 50 inches, 33 more than 40 inches, 28 more than 30 inches, 41 more than 20 inches, and 47 more than 10 inches. The others were near the starting point or had moved toward the other end of the bin. In the bin with grass only 10.2 percent had moved more than 40 inches, while in the fallow bin 63.5 percent had moved farther than this. In the bin with grass 95.6 percent were in the upper 5 inches, where the roots of the grass were available as food, and none were deeper than 9 inches, while

in the fallow soil only 16.5 percent were in the upper 5 inches and greatest numbers were near the bottom of the bin. Thirty-five of the 79 grubs recovered were below the 9-inch level. In the bin with grass 17 grubs had changed to the prepupal condition, but none in the fallow bin had made this change."

TRUCK CROP AND GARDEN INSECTS

Winter kill of beet leafhopper correlates with fat content of bodies.---J. C. Chamberlin, D. E. Fox, and R. A. Fulton, Twin Falls, Idaho, report: "The fat determinations (of Eutettix tenellus Bak.) made in connection with the February set of hibernation cages show an interesting correlation with winter kill. In every instance this past winter mortality as shown by cage recovery is paralleled by positive corresponding variation in fat content. Thus in the present series of cages, the insects from Castleford plot showed the lowest fat content, with a determination of 25.4 percent; Burley was next, with 25.9 percent; Wendell next, with 26.7 percent; and Twin Falls highest, with 27.5 percent. This is the same as the order of cage recovery (Castleford, 0.5 percent; Burley, 0.8 percent; Wendell, 3.5 percent; and Twin Falls, 17.0 percent) * * * These determinations (Twin Falls) compare with 34.0 percent on February 17, 1932. It is interesting to note that these are the lowest records that have thus far been made on overwintering females in the Twin Falls area. The determinations throughout the current winter, as for 1931-32, show that a drop in fat content follows a sudden drop in temperature."

Control of cyclamen mite and broad mite.---Reporting further on his study of Tarsonemus pallidus Bks. and T. latus Bks. (see Monthly Letter, October and November 1932), F. F. Smith, Washington, D. C., says: "Fumigation tests with naphthalene or calcium cyanide have shown that the broad mite is more readily killed than are the exposed cyclamen mites. * * * in some cases at least that there has been a confusion of the species of mites concerned. As the cyclamen mite is so well protected by its position on the plant, it is evident that once established it is not readily destroyed. * * * One of the heat treatments, either immersion in hot water for 15 minutes at a temperature of 110° F. or exposure for 30 minutes at the same temperature in saturated atmosphere (vapor heat), appears to be the most successful. * * * Mites beneath the sepals and petals on buds have been killed by either treatment and the flowers opened without further injury. * * * The plants must be kept shaded with newspapers for 24 to 48 hours following treatment to prevent foliage injury. Most of the host plants that have been tested are tolerant of this treatment; snapdragons and begonias are moderately injured; and tips of chrysanthemums are sometimes slightly injured, but new growth develops later on these plants."

Molasses-derris extract spray fatal to gladiolus thrips.---H. H. Richardson, of the greenhouse insects laboratory, Washington, D. C., re-

ports: "Several series of tests have been completed with the combination of molasses (3 to 5 percent by volume) with derris extract diluted 1 to 250, so as to obtain a concentration of 1 to 5,000 rotenone. Complete kill of Taeniothrips gladioli M. & S. was obtained with this spray in a series of tests lasting 7 to 8 days. * * * In two series of tests (run in duplicate) the sprayed plants were kept in the greenhouse, where they received some direct sunlight (through the glass) and the toxicity of the residue was tested from time to time. In the first series a total of 164 larvae were killed over the 7-day period, some being killed while hatching, especially when in contact with a droplet of this residue, but most of them being killed within 12 to 24 hours after hatching, the toxic action being similar to, if not faster than, that of paris green with molasses. In other tests in this first series the residues on sprayed plants which had stood 7 days in the greenhouse were still very toxic to both adults and larvae (100 percent kill of both in 48 hours in vial tests; checks, no kill). In a second series with molasses-derris spray, a 100 percent kill was obtained of a total of 342 larvae hatched over a period of 6 to 7 days. Of these 23 percent were killed while hatching; the remainder, from 12 to 24 hours after. After two weeks the residue was still very toxic, killing 100 percent of adults in vial tests in 48 hours (checks, no kill). * * * Considering what is already known about the stability of derris sprays, it is remarkable that derris extracts should apparently be so stable in combination with molasses. This may be due to the slightly acid medium provided by molasses (pH of this molasses was 5.9)."

Ethylene chlorohydrin as fumigant against larvae of wireworm.--- Reporting on experiments "to determine the effect of a solution of ethylene chlorohydrin in ethyl alcohol" R. S. Lehman, Walla Walla, Wash., says, "It was found that the same concentration of ethylene chlorohydrin in alcoholic solutions of different percentages resulted in a variation in mortality to the larvae (of Limonius californicus Mann.). That is, in solutions containing from 60 to 95 percent absolute alcohol, the number of cc used was varied so that the same concentration of ethylene chlorohydrin was obtained each time. It was found that as the percentage of alcohol decreased the mortality of the larvae increased. That is, as the concentration of the ethylene chlorohydrin increased in the solution, although the concentration of ethylene chlorohydrin used in each experiment was the same, the mortality of the larvae increased. This did not prove to be true when distilled water was used to obtain various dilutions of the ethylene chlorohydrin. The mortality was practically the same as one would expect with the same concentration. An adequate explanation of the above recorded phenomena is lacking. There should be no chemical reaction between the two compounds. It was thought at first that the ethyl alcohol may have had an anesthetic effect upon the larvae, reducing the rate of respiration and thus causing less of the ethylene chlorohydrin to enter the body of the insect. But as the ethyl alcohol appeared to have little effect upon the larvae in the control which contained the maximum quantity of ethyl alcohol used in the experiment, it is not thought that an anesthetic effect was produced. Also, the fact

that ethyl alcohol was used as a solvent for several other compounds employed in previous experiments without the above recorded effect would indicate that the latter explanation will not suffice for this result. * * * If the use of a solvent for a fumigant lessens the toxicity of that fumigant under certain conditions it is very important that those conditions be known. The results obtained with ethylene chlorohydrin when not in solution compared favorably with the effect produced when the ethylene chlorohydrin was dissolved in water."

Insecticidal tests of stored pyrethrum powder.--C. F. Stahl, Sanford, Fla., reports that a test was made in which "nearly mature larvae of the celery leaf tier (Phlyctaenia rubigalis Guen.) were exposed to 1/20 gram of pyrethrum dust (that had been stored in open and closed containers for different periods of time) for 30 seconds after the dust had been blown into a bell jar at 10 pounds' pressure and allowed to settle for 2 seconds. This method is an adaptation of that developed by the Division of Insect Toxicology and Physiology and has been found to give very uniform results. Using 50 larvae in groups of 10 each, the results * * * indicate that deterioration of pyrethrum powder is much greater in open containers and develops much faster during the second year than during the first."